from north to south, which was closed with shutters when not in use. The axis was made of conical iron plates lighter and more inflexible than in the old transit. The pivots were conical and fitted into brass holes on the sides of the pillars, into which the axis was tightly pressed with screws. The axis could be shifted a little both in altitude and azimuth. Römer had afterwards occasion to regret that the instrument was supported on wooden pillars and not on stone. The tube was not fixed immediately to the axis but to the circle. It was five feet long, and allowed stars of the second magnitude to be observed during the day. It had three horizontal wires in the focus and seven vertical; the intervals between these were twenty-four seconds in the equator, and the time was noted to a fraction of a second. There were three good clocks in the observatory. The circle which was fastened to one end of the axis was about five feet in diameter. It is not unlikely that Römer afterwards considered a smaller size preferable. He disapproved altogether of the use of the quadrant and sextant, and said that a circle of four feet was superior to a quadrant of ten. This circle had been divided to ten minutes with Römer's own hands, and in the microscopes three seconds were easily discerned. It was read by two microscopes fixed side by side to one of the supports of the axis. Before the observations were made the circle was ascertained, by means of a plumb-line, to be vertical. The errors of collimation and azimuth were determined in the same way as with the old instrument, and Römer had fixed two meridian-marks, which were besides used to discover whether the microscopes had changed their position. Römer was the first who determined the azimuth from culminations of circumpolar stars above and below the pole.

Besides this instrument Römer had also a transit instrument placed in the first vertical, but that was not used much because it had been so badly made by the workmen that it disturbed the meridian circle with which it had one of the supports in common. Römer intended to observe declinations of fixed stars with it and compare them with those observed in the meridian, and thereby determine the refractions. He would also have observed the sun with it.

After Römer's death, on September 19, 1710, his observatory was neglected and the instruments were spoiled, when at last they were sent to Copenhagen. Römer was to have published a description of the observatory and his methods, but was prevented by the illness which terminated his active career, and the descriptions were afterwards given from memory by his little gifted pupil and successor, Horrebow, who did not fully understand all the precepts of his great master. All his observations and instruments were ultimately destroyed by the conflagration of the observatory in 1728, except three days' observations, which Römer had intended to use for his description of the instruments. Thus it came to pass that this great genius passed away without any adequate influence upon the progress of the science. These three days' observations have been carefully reduced by Dr. Galle; their accuracy is shown to be almost equal to that attained at the present day.

In England the methods adopted by Flamsteed were followed until Bradley permanently introduced Römer's transit at Greenwich. He continued, however, to use the quadrant for declinations, and in most other observatories of this country the right ascensions and declinations continued to be observed with different instruments. We may also trace to this circumstance the immovable heavy mural instruments so common in this country.[1] The French astronomers adhered to Picard's methods until lately, and used quadrants even for the right ascensions; the transit in the first vertical was not used before it was rediscovered by Bessel. On the whole we may say that no observatory fully expressed Römer's ideas before Bessel's and Struve's practical talents had altogether changed the face of the science. W. DOBERCK

[1] On the accompanying plates are represented one of the formerly common mural circles (Fig. 2), and also a meridian circle (Fig. 3); both instruments of the U.S. Naval Observatory, Washington.

NOTES

PROF. KIRCHHOF has been created a Knight of the Order of Maximilian for Science and Art, by King Louis of Bavaria.

M. BRUNET, the late French Minister of Public Instruction, nominated M. Gramme, the inventor of the well-known machine for generating electric light, a Chevalier of the Order of the Legion of Honour.

NEARLY 200*l.* have already been promised for the Darwin Memorial Fund at Cambridge.

A MONUMENT was inaugurated on November 23 at Rouen in honour of M. Pouchet, the celebrated naturalist, who organised the Rouen Museum in 1828, and died director in 1872. M. Pouchet was a correspondent of the French Institute. He was a supporter of the theory of spontaneous generation.

THE Rhine Provincial Museum in Bonn has succeeded in purchasing the famous collection of prehistoric remains from the Neander Valley, hitherto in the possession of the late Prof. Fuhlrott, of Elberfeld, although a high price had been offered from England.

PREPARATIONS are being made at the Champ de Mars, Paris, for executing Foucault's pendulum experiments on an enlarged scale. His apparatus was suspended in 1851 under the dome of the Pantheon. It was in operation for a long while and removed only when the building was transformed into a church after the *coup d'état* in 1852. The weight of the pendulum will be 300 kilogrammes, and it will oscillate at the end of an iron wire from 65 to 70 metres long. Thus a special construction will be required for its suspension. The pendulum will be suspended above a grooved pipe which will move freely on an axis in its centre. The pendulum in oscillating will displace this pipe, which will remain, like the pendulum itself, fixed in space, in reference to the constellations. Underneath the pendulum will be arranged a large terrestrial globe, from 25 to 30 metres in diameter. This globe, resting on the ground, will necessarily follow with the spectators the movement of the earth. The pipe, on the contrary, supported by a pivot at the extremity of the axis, will carry large indexes, which will appear to be displaced with it. The globe, which will represent the earth, having a considerable volume, the movement of these indexes will be visible; it will render tangible in some degree to the least attentive, the rotation of the planet on its axis.

IN the *Times* of Monday is a pleasant leader on the Royal Society *à propos* of the anniversary last Friday. The article contains nothing striking, the drift of it being that the Royal Society has done much to foster science, but that science never was altogether, and is now not at all, dependent on the Royal Society for its progress—which is probably true. The article concludes with a strongly-expressed desire to see literature, "the old learning," recognised by the Royal Society, that, in fact, it should be turned into a sort of academy, after the pattern of that of Paris. But practically the French Academy is a collection of societies, one of which, like the Royal Society, devotes itself wholly to science.

AN article in Tuesday's *Times* describes some experiments which are being made at the Fulham gas-works in the lighting of lamps by electricity. The patent is that of Mr. St. George Lane Fox, the distinctive feature being an electro-magnetic apparatus attached to each lamp, and connected with a central station, at which an electric current is generated. If the experiments prove successful and the apparatus is adopted, a great saving is likely to be effected. All practical difficulties seem, however, to have been solved in America Electricity

has been tried for the purpose of lighting and extinguishing 220 street lamps in Providence, R. I., scattered over a district nine miles long. One man attends to the whole business and does it in fifteen seconds. The method has now been on trial for some months, and a saving of ten dollars per lamp per year is reported.

As might have been expected, Mr. Stanley has been received with unbounded enthusiasm at the Cape, and his followers petted and loaded with presents to such an extent that they must feel amply rewarded for all their labours. Mr. Stanley in his lecture at Cape Town, reported in the *Times* and *Telegraph*, went over all his journey again, and defended himself stoutly against the criticisms which have been made on his conduct. He is expected in England about Christmas. The United States House of Representatives are to pass a vote of thanks to Mr. Stanley, and the King of Italy is to present him with a gold medal. Would it not be just to recognise, in some public manner, the great service rendered to geography by the organisers of the expedition, the proprietors of the *Telegraph* and *Herald*?

COL. W. H. REYNOLDS has concluded a contract with the English Government by which the Post Office Department has adopted the Bell telephone as a part of its telegraphic system. In a recent telephonic experiment in connection with the cable 21¾ miles long, between Dover and Calais, there was not the slightest failure during a period of two hours. Though three other wires were busy at the same time, every word was heard through the telephone, and individual voices were distinguished. This important experiment was conducted by Mr. J. Bourdeaux, of the Submarine Telegraph Company. Some very successful experiments were made with the telephone on Saturday night between Aberdeen and Inverness, a distance of 108 miles. Songs and choruses were distinctly transmitted, and conversation was carried on at times with marvellous distinctness, notwithstanding the weather was unfavourable. The experiments were made with Prof. Bell's instruments. The Berlin correspondent of the *Daily News* states that a Berlin house is making a number of telephones for experimental use in the Russian army. The result is awaited with great curiosity in military circles. The *Cologne Gazette* denies that any telephone is in existence between Varzin and Bismarck's office at Berlin. Our contemporary says that the distance, 363 kilometres, is too large for using a telephone with any advantage.

ON Dec. 1 the council of the Paris Observatory held its second meeting for deliberating upon the improvements to be suggested to the Government. The existing regulations had been printed and distributed among members, who discussed them article by article, in order to better understand their bearing. M. Faye, the present Minister of Public Instruction and one of the councillors, did not resign his office. He merely intimated to his colleagues that he should not take part in the discussions so long as he should be obliged to remain a minister for the welfare of the commonwealth. Consequently it may be considered as certain that the Assembly will come to no conclusion so long as the political crisis does not permit the learned astronomer to resume his usual labours. M. Faye, whose voice will have great weight, is a strong supporter of the existing connection between astronomy and meteorology.

THE Society of Apothecaries have decided to offer two prizes for competition by young women under twenty years of age, in the science of botany. The prizes will consist of a gold and a silver medal and books, to be awarded to the first and second candidates respectively in order of merit. The Rev. M. J. Berkeley (the examiner for the prizes given by the Society to medical students) will conduct the examinations. The date of the examination and the conditions of competition will be published shortly.

A PRIZE of 1,000 Italian lire has been offered by the Committee of the Italian Alpine Club for the best description of any Italian mountain group.

THE Horseshoe at Niagara, the *New York Tribune* states, is now a right-angle rather than a curve. The rocks in the centre have been eaten away from year to year, and now the side walls are crumbling. On November 17 a large section of rock toward the Canada shore fell with a tremendous crash, and during the night a still larger area went down. The falls now wear a new face, and visitors will undoubtedly be charged twenty-five cents extra next season.

THE Russian Government has issued an ukase according to which Novaya Zemlya is to be colonised. The Norwegian journal *Tromsoeposten* now reports that on August 28 last six Russian sailing vessels arrived at Tromsoe, carrying the necessary building materials such as timber, bricks, and lime for the construction of six houses upon Novaya Zemlya. These houses were to be constructed during the course of the present autumn and are to be inhabited by six Samojede families, who will form the first colonial residents upon the island. The Russian Government hopes by the colonisation of Novaya Zemlya to be able to establish successfully a permanent commercial communication with the mouths of the Yenisei and Obi Rivers, while at the same time the new colony may form a convenient place of exile for political criminals.

THE deepest artesian well in the world is being bored at Pesth, and has reached already a depth of 951 metres. The well at Paris, which measures 547 metres has hitherto been the first. The work is undertaken by the brothers Zsigmondy, partially at the expense of the city, which has granted 40,000*l.* for the purpose, with the intention of obtaining an unlimited supply of warm water for the municipal establishments and public baths. A temperature of 161° F. is shown by the water at present issuing from the well, and the work will be prosecuted until water of 178° is obtained. About 175,000 gallons of warm water stream out daily, rising to a height of 35 feet. This amount will not only supply all the wants of the city, but convert the surrounding region into a tropical garden. Since last June the boring has penetrated through 200 feet of dolomite. The preceding strata have supplied a number of interesting facts to the geologist, which have been recorded from time to time in the Hungarian Academy of Sciences. Among some of the ingenious engineering devices invented during the course of the boring are especially noteworthy the arrangements for driving in nails at the enormous depth mentioned above, for pulling them out (with magnets), for cutting off and pulling up broken tubes, and above all, a valuable mechanical apparatus by means of which the water rising from the well is used as a motive power, driving the drills at a rate of speed double that previously imparted from the mouth of the well.

THE preliminary works for boring the British Channel Tunnel are being prosecuted with very great activity at Sangate. A shaft has been sunk to a depth of 100 metres, and the experimental gallery has been commenced. It is to be continued for a kilometre under the sea. If no obstacle is met with the work will be continued without any further delay. Two powerful pumps have been established for elevating the water which, of course, filters in in large quantity.

IN the French estimates for 1878 a supplementary credit of 5,000*l.* is asked for the learned societies in connection with the exhibition of 1878.

AN international exhibition is to be held at Milan in 1879.

AN excellent measure was decided on by M. Brunet, the late French Minister of Public Instruction. Special maps on the

scale of $\frac{1}{10000}$ are to be designed of the country around each college, so that pupils when out walking, may be enabled to practice topography. These maps will extend to a radius of thirty kilometres from the college, and will be placed in the hands of masters.

THE Geographical Society of Paris will hold its anniversary meeting on December 19; a banquet will take place at the Grand Hotel on the 22nd.

THE administration of the Eastern Railway of France has intimated to the Geographical Society of Paris that orders will be given for inscribing on the wall of each station the altitude above the sea, the distance from Paris, the name of the chief town of the district, the name of the department, &c., &c. Thus railway travellers will learn the geography of France *nolens volens*.

IN last week's NATURE Mr. G. J. Hinde gave some details concerning the earthquake of November 4 in Canada. The *New York Tribune* gives some interesting details concerning the same earthquake in the States as well as subsequent earthquake phenomena. The shocks were felt in the east, in the west, and in the south. Commenting upon them the *Chicago Evening Journal* makes an interesting statement about the recent active condition of a little-known volcano in Nebraska. The latest earthquake shocks, it states, which especially affected Western Iowa, and were still sharper in North-eastern Nebraska and South-western Dacota, bring to mind the fact that the "Ionia Volcano," known to a few scientific investigators of the west as existing in the high bluffs near the little village of Ionia, in North-eastern Nebraska, is directly in the centre of the area traversed by the earthquake vibrations. Being in a retired spot, miles away from any line of travel, on the west bank of the Missouri River, in a bluffy region, the little volcano has attracted the attention of only a few of those who make such subjects a study, and hence is not mentioned, as we believe, in any of the works on geography or geology. The occurrence of the earthquake, with its key or centre at the Ionia volcano, makes worthy of remark the fact that for a few months past this little American Vesuvius has been unusually active. Its vapours have arisen almost constantly, and, for the first time since white men have viewed its action, these vapours have been easily distinguishable for a dozen or more miles away. The first of these disturbances of the earth's surface was perceived on November 4 by the inhabitants of Northern New Hampshire, Vermont, Western Massachusetts, Northern and Central New York, and Canada. The course of the shocks was from west to east. They were especially violent in the Adirondack Mountains region. On November 15 an earthquake shock was felt in the States of Kansas, Nebraska, and Iowa, and in Dakota Territory. The shock was a very severe one, and its effects were perceptible in most of the cities of the States mentioned. In Sioux City, Iowa, there were two earthquake waves, the second being the most powerful and immediately following the first. There was a continuous vibration lasting forty-five seconds. In Kansas the shock was noticed at Topeka and Atchison. At Topeka, in the Santa Fé depot, the employés felt the building rocking gently from north to south. On November 16, the day following the earthquake in the west, a violent earthquake shock was felt at Knoxville, Tenn. The shock was apparently only perceived at this place in the south, as there are no reports from any other southern city of such an occurrence.

NOTHING is as yet known about the Marquis Antinori and his expedition. The news of his death, which did not emanate, we believe, from the Italian Geographical Society, may therefore be considered as premature. Matteucci, who takes a lively interest in the fate of the Antinori expedition, will probably be able to gather more precise and definite information at Khartoum.

PROF. STOPPANI, the eminent Italian geologist, has been called to occupy the chair of geology at the Instituto Superiore of Florence. He delivered his opening discourse on Saturday, November 17, and will give exclusively public lectures during the whole following scholastic year.

THE "Science Primers" by Hooker, Balfour Stewart, and Geikie, have been translated into Italian by Profs. Pedicino, Cantoni, and Stoppani, and published in nicely-bound small volumes by the editor, U. Hoepli, of Milan.

THE enormous whale captured in the Gulf of Taranto in February last, has now been studied by Prof. Capellini, who found it to be a new species, to which he gives the name of *Balæna tarentina*.

WE are informed that Dr. Forsyth Major, of Florence, intends to publish a periodical for the "Zoology and Palæontology of Vertebrata," which will contain original articles in four languages. We cannot but wish the best success to Mr. Major's interprise, which is the first of the kind in Italy or anywhere else, we believe.

A NEW and perfectly mounted meteorolcgical observatory, under the direction of Prof. Nardi, was inaugurated on Sunday, November 25, in the Seminary of Fiesole, near Florence. The funds for the same were subscribed by the Bishop of Fiesole and the Italian Alpine Club. Another observatory will shortly be opened under the care of the latter society, at Castel Piano, on Mount Amiato, near Siena. The number of meteorological stations in Italy thus amounts to about eighty, the greater part of which have been founded on the initiative, and by the support, of the Club Alpino, who deserve every praise for their continual and strenuous efforts to further and foster the study of meteorology in Italy.

A MOST elaborate monograph has been published by a distinguished Italian geologist, Prof. Baretti, on the geology of the large Alpine group known under the name of Gran Paradiso in the Graiian Alps.

IN the *Annali di Storia naturale del Museo Civico di Genova*, the illustrious traveller and botanist, Prof. O. Beccari, describes the wonderful gallery or bower-constructions of the *Amblyornis inornata*, observed by himself in the Arfak Mountains. The huts and gardens, as built and laid out by this bird, which is called "the gardener," seem to surpass any production of intelligence and taste for the beautiful hitherto described and observed in birds of the Paradise family.

ON the very rich collections made in, and sent over from, New Guinea by those intrepid and persevering champions of science, Messrs. O. Beccari and D'Albertis, Prof. Mantegazza has completed a series of anthropological and ethnographical studies, the first part of which are now being published in the *Archivio per l'Antropologia e la Etnologia*. It may be mentioned that the museum, founded by Prof. Mantegazza in Florence contains the largest known collection of Papuan skulls, the number of which exceeds two hundred.

THE additions to the Zoological Society's Gardens during the past week include a Vervet Monkey (*Cercopithecus lalandii*) from South Africa, presented by Mr. F. H. Taylor; a Green Monkey (*Cercopithecus callitrichus*) from West Africa, presented by Mr. J. R. Phillpotts; a Spotted Ichneumon (*Herpestes auropunctatus*) from Persia, presented by Mrs. Fleuss; a Common Ocelot (*Felis pardalis*), a Scarlet Ibis (*Ibis rubra*), a Fulvus Tree Duck (*Dendrocygna fulva*) from South America, presented by Mr. George Ransom; a long-eared Owl (*Asso otus*), European, presented by Mr. W. H. Millington; three Weeper Capuchins (*Cebus capucinus*), a Squirrel Monkey (*Saimaris sciurea*) from South America, two Cheer Pheasants (*Phasianus reevesii*) from North India, purchased; a Black-footed Fox (*Canis jubata*) and an Azara's Fox (*Canis azaræ*) from South America, deposited.